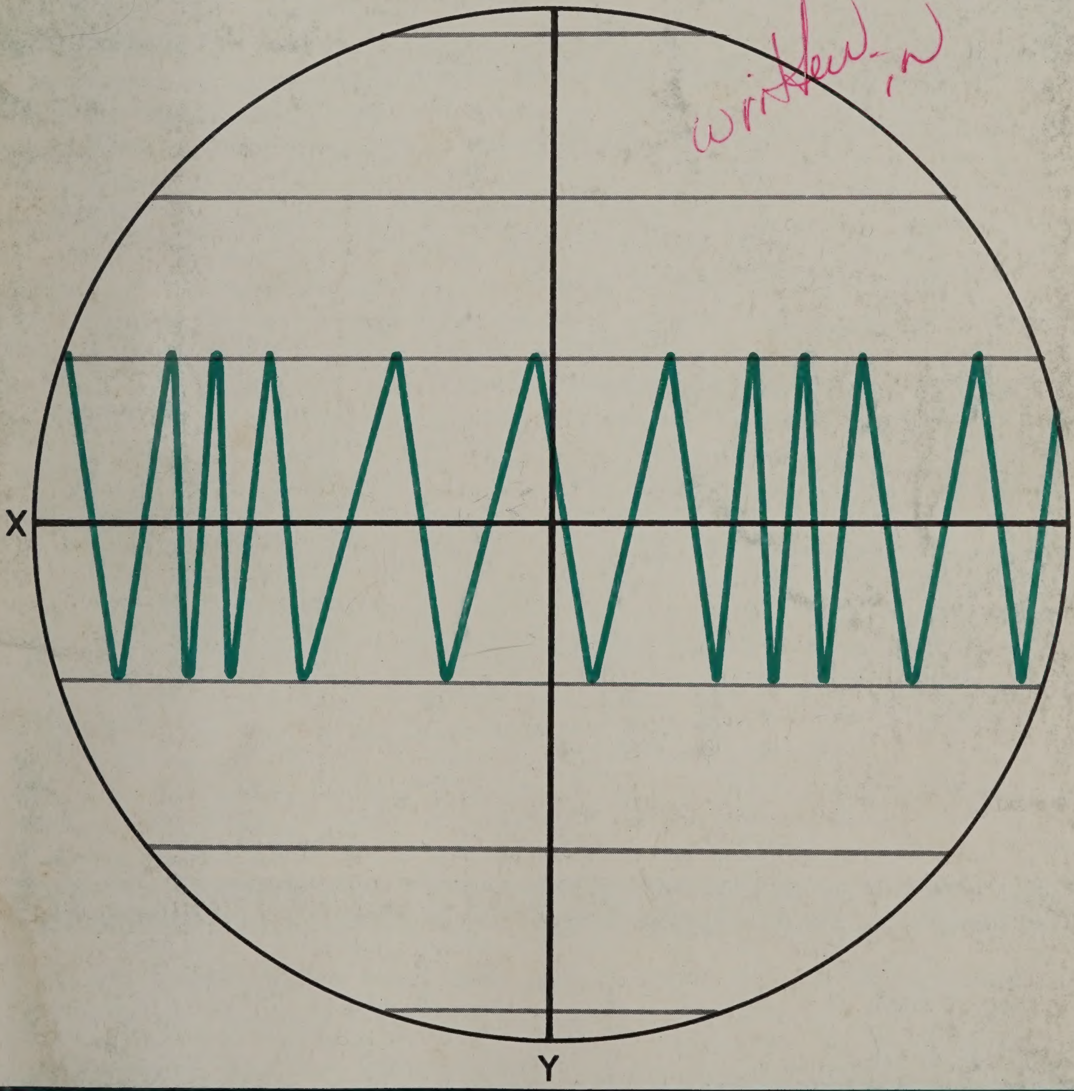
(6)

NOVEMBER 1961
40 Cents

COMMUNICATION HORIZONS

written in



THE PROFESSIONAL COMMUNICATIONS MAGAZINE

FEATURED THIS MONTH

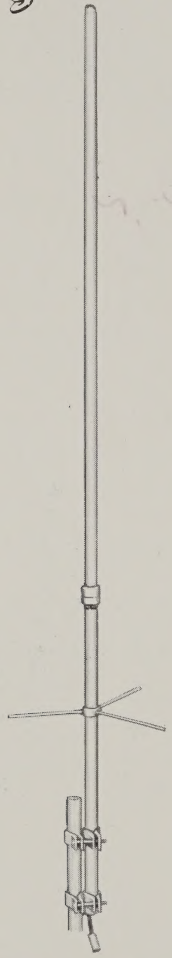
Three SY-PEP Papers
FCC's New Look at UHF-TV
Congressional Communications
Wrap-Up

the antenna specialists co.

12435 EUCLID AVENUE • CLEVELAND 6, OHIO

the finest brand for every band

BASE STATION 6 db GAIN*

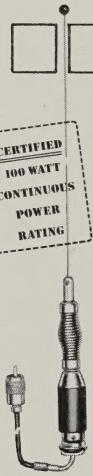


MODEL ASP-298

This **Colinear Vertical** 6 db **gain antenna** provides omnidirectional coverage in the 130-174 mc range. Gives 4 times the radiated power of your transmitter and is twice as sensitive in receiving. Heavy duty construction throughout with adequate lightning protection. Write for complete listings in Catalog SD-152C10 (Base Station Antennas).

* (REFERENCE: Ground Plane Antenna)

MOBILE ROOF-TOP ANTENNAS



CERTIFIED
100 WATT
CONTINUOUS
POWER
RATING

Model ASPR177

½ wave length, high gain*, roof top antenna. 130-174 MC. 3db gain doubles transmitting power. Sealed, tamper-proof transformer. 100 watt continuous load.

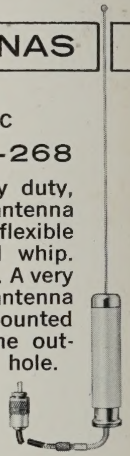
MODEL ASPR203 Kit to adapt ASPR177 to fit GE and RCA mounting Base and convert these models to ½ wave length. 100 watt continuous load.

MODEL ASPR206 Same as ASPR203 for Motorola models. 100 watt continuous load.

30-50 mc

Model ASP-268

This is a heavy duty, Base loaded antenna with extremely flexible stainless steel whip. Only 44″ overall. A very neat appearing antenna that can be mounted entirely from the outside into a ¾″ hole.



*(REFERENCE: ¼ Wave Length Antenna)

Write for Complete Listings of Communication Antennas in Catalog SD-144C10

SOLD THROUGH ELECTRONIC DISTRIBUTORS EVERYWHERE

Please send me the free catalogs checked below:

- ☐ **SD-152C10** Base Station Antennas
- ☐ **SD-147C10** Citizens Band Antennas
- ☐ **SD-144C10** Communication Antennas

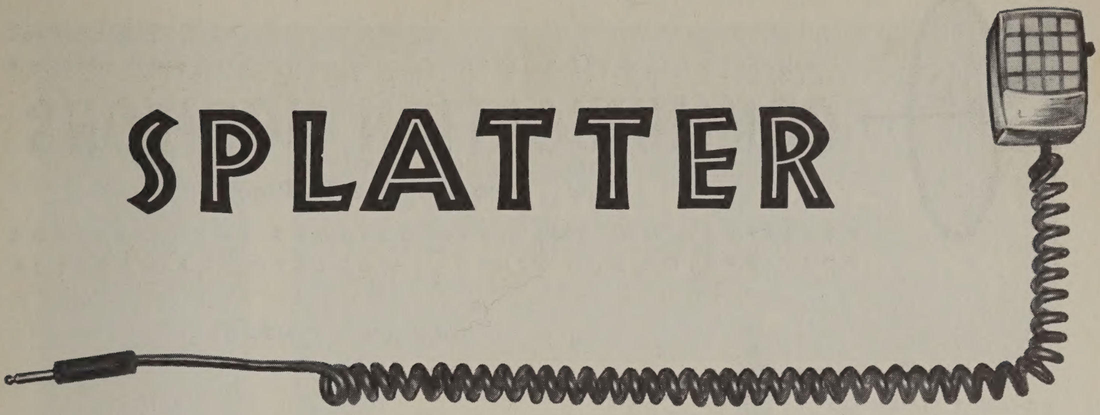
the antenna specialists co.
12435 Euclid Avenue • Cleveland 6, Ohio

NAME

ADDRESS

CITY AND STATE

SPLATTER



Editorial Notes from
Communication Horizons Editor
Robert B. Cooper, Jr., K6EDX

EIA TO STUDY ANTENNA GAIN

A marketing manager for one of the more prominent and influential antenna manufacturing firms wrote on September 14 . . .

" . . . Congratulations on your September editorial criticizing antenna gain claims. We agree that claim comparison does not give a reliable indication of relative performance.

"Gain determination is not a simple matter. There is no effective standard. You have cited the National Bureau of Standards. While (the NBS is) a leading center of technical competence, the National Bureaus of Standards has not formulated a standard suited to our industry. Most of their work was done on scale models (400 mc.) high gain (20 db or more) directive antennas (see NBS circular 589) while most land mobile fixed station antennas are not high gain, are not directive, and are not used at 400 mc.

"NBS uses the comparison method of gain determination with certain refinements. They conclude their work with a statement of its limitations. We use pattern integration methods with certain other refinements and conclude by derating our measurements by empirically determined amounts to assure meeting our claims *after* allowing for manufacturing deviations.

"The Industrial Products Division of the Electronic Industries Association has established an RF Transmission Components Section. This section includes an antenna subsection and an engineering committee on antennas will be formed shortly. Traditionally, the work of such committees has centered on definitions, standards and measurements. We believe this is the best way to establish a (industry) standard."

It is indeed encouraging to learn of the EIA's concern in the field of antenna engineering and measurement. Certainly a project such as outlined by the correspondent shows more promise of reaching a sensible plateau of "standards" than anything proposed to date.

As the "RF Transmission Components Section" of the EIA meets and works towards formulating a set of antenna measurement standards for the industry, we will attempt to keep readers advised through these pages.

SY-PEP Awards

The first quartely judging period in the SY-PEP awards program ended September 15. Three SY-PEP papers were received, in entirety, before the closing date. Each appeared in last month's issue of Communication Horizons.

There are five categories in the SY-PEP program. Judging is based upon the best paper of a category, for each judging period and the best overall paper for a quarter. In the "Systems-Theoretical" category the paper presented by Mr. Andrew Andros of the Hy-Gain Company, Lincoln, Nebraska, was the sole entry.

The paper presented by Mr. Robert F. Lewis, Prodelin, Incorporated titled "Transfer Efficiency vs Reflected Power" was the

(Continued on page 19)

NOVEMBER 1961
Volume 1 • Number 6

COMMUNICATION HORIZONS

and "Two-Way Radio Digest"

PUBLISHED MONTHLY BY HORIZONS PUBLICATIONS
POST OFFICE BOX 3206 • MODESTO, CALIFORNIA

STAFF

R. B. COOPER, JR., K6EDX
Publisher-Editor

RICHARD P. STAUDUHAR
K6ERG
Managing Editor

TOM KNEITEL
WA6SYV/K12XGT

ART W. BROTHERS, W6IQJ
Associate Editors

ROBERT E. BROOKING
Communications Engineer
City of Burbank, California
Contributing Editor

ROBERT E. TALL
Bureau Chief,
Washington Office

JACKIE JOHNSON
Production Coordinator

JOHN LANNING
Art Director

SHERRY GREENER
Circulation Manager

OFFICES

1016 - 14th STREET
MODESTO, CALIFORNIA
Telephone LAmbert 4-7395

•

1327 F Street, N.W.
Washington 4, D.C.
Telephone STerling 3-2482

ADVERTISING

Communication Horizons Magazine accepts commercial display advertising from bona fide manufacturers and distributors of communications equipment and associated apparatus. Advertising rate card and coverage data available upon request.

Eastern-Midwest Advertising Representative
COWAN PUBLISHING CORP.
300 West 43rd Street
New York 36, New York
JUdson 2-4460
Dick Cowan, WA2LRO
Jack Schneider, WA2FPE

CIRCULATION

Communication Horizons Magazine is read monthly by nearly 10,000 two-way communication engineers, technicians, salesmen, installers and users. Detailed circulation breakdown available upon request.

SUBSCRIPTION

Subscription rates in the United States, Canada—$4.00 per year. Single copies not available. Subscriptions outside the U.S.A. and Canada—$5.00 per year. Subscription remittances should be made by bank draft or postal money order.

Airmail subscription available at $7.00 per year, U.S. and Canada.

TABLE OF CONTENTS

SY-PEP PAPERS

A VERTICAL ANTENNA OF TRANSPOSED SECTIONS OF COAXIAL CABLE
Harold P. Wheeler, Wheeler Lab. 4

R"C"C NOT SO 'COMMON' IN HAWAII
Kenneth Bostick & Robert W. Miller 10

DANGER-TEFLON!
Skip Yem, A. W. Weart Brothers Co. 20

FEATURES

STORY IN PICTURES
National Mobile Radio System
1961 Dallas Convention 8

CONGRESSIONAL WRAP-UP
CH Washington Bureau Chief Robert E. Tall 24

DEPARTMENTS

EDITORIAL
"Splatter" 1

SERVICE NOTES FROM AEROTRON
"Helpful Hint of the Month" 14

PUBLIC SAFETY COMMUNICATIONS
"Robert E. Brooking Reports" 16

OUR MAN IN WASHINGTON
"Robert E. Tall Reports" 20

NEWS BRIEFS 25

MOTOROLA FIELD MEN
"Service Profile" 26

NEW PRODUCTS
"CH Showcase" 27

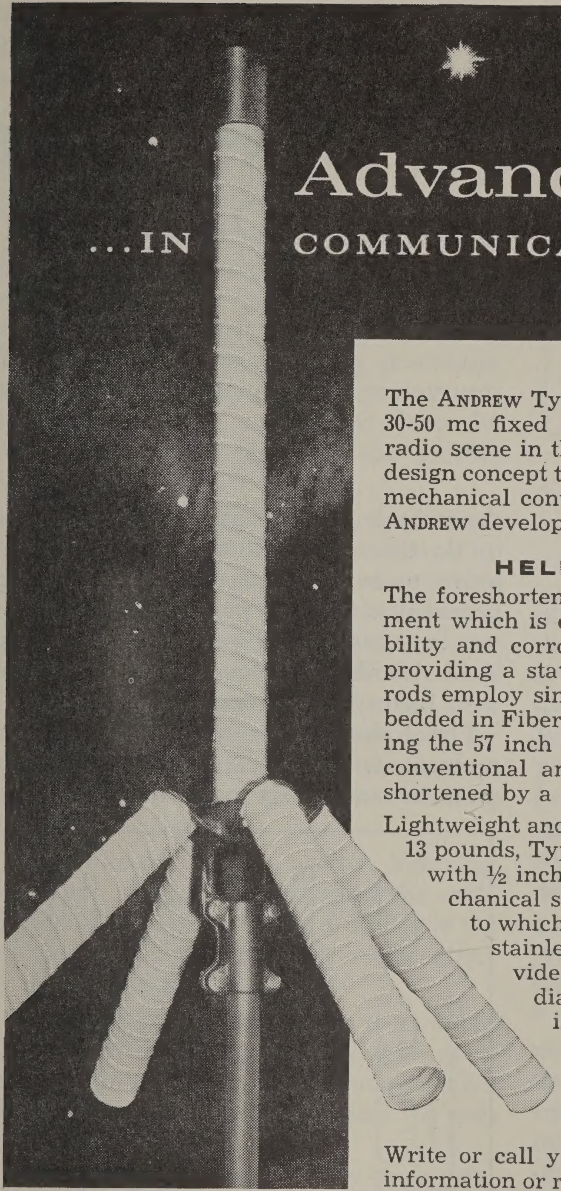
COMMUNICATION HORIZONS (title registered U.S. Post Office) entered as second-class postage material May 20, 1961. Second-class postage paid, Modesto, California. All rights reserved.

POSTMASTER: Send Form 3579 to Communication Horizons, P. O. Box 3206, Modesto, California.

Communication Horizons' readers — always first to know, the best informed, the first to act.

Advanced design

...IN COMMUNICATION ANTENNAS



HELIPOLE

The Andrew Type 902 Helipole* is the first basically new 30-50 mc fixed station antenna to appear on the 2-way radio scene in the past 12 years. Type 902 employs a new design concept that combines improved performance with mechanical convenience. It is the result of an extensive Andrew development program.

HELIPOLE CONSTRUCTION

The foreshortened radiator employs a bifilar helical element which is encased in Fiberglass for strength, durability and corrosion resistance. One helix is grounded, providing a static drain path. The other is fed. Ground rods employ single helix conductors which also are embedded in Fiberglass. Size reduction is shown by comparing the 57 inch radiator of Type 902 with 101 inches of a conventional antenna at 30 mc. Ground rods are also shortened by a proportionate amount.

Lightweight and strong—with a maximum total weight of 13 pounds, Type 902 is designed to withstand 30 psf load with ½ inch of radial ice. The focal point of this mechanical strength is found in an aluminum casting to which ground rods and radiator are bolted with stainless steel hardware. Direct mounting is provided for members from 1¾ to 2½ inches in diameter. VSWR of this unity gain antenna is less than 1.5.

Economically priced Andrew Type 902 is the best performing, corrosion resistant high wind load antenna on the market.

Write or call your Andrew sales engineer for complete information or request Bulletin 8467.

ANDREW

ABOVE ALL AN ANDREW ANTENNA...

Andrew
CORPORATION
P. O. Box 807 • Chicago 42, Illinois
Boston • New York • Washington • Los Angeles • Toronto

A VERTICAL ANTENNA OF TRANSPOSED SECTIONS OF COAXIAL CABLE

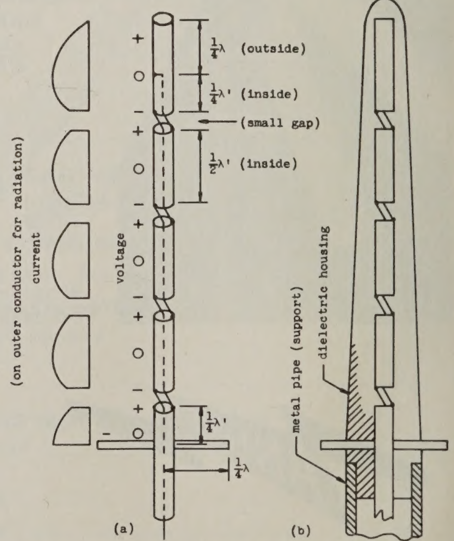
Harold A. Wheeler
Wheeler Laboratories
Great Neck, N.Y.

A vertical array of colinear vertical dipoles is made of a series of sections of solid-dielectric coaxial cable with their inner and outer conductors transposed at each junction. Each section has an effective length of ½ wavelength in the cable, so the radiating gaps between the sections are all excited in the same polarity. A model designed for 450 mc. has 9 sections of cable; the length is 2.9 wavelengths in free space and the gain is 6 db over a half-wave dipole. This type of antenna has been developed in co-operation with Communication Products Company of Marlboro, N.J.

Some systems for mobile communication require for their fixed stations a type of antenna which concentrates the transmitted power in all horizontal directions. If also vertical polarization is required for reaching mobile stations at small heights above the ground or water, the best type of antenna is a vertical array of colinear vertical dipoles.

If these dipoles are to be connected with a transmission line or coaxial cable, it happens that the cable in any nearby vertical position acts as a reflector and interferes with the normal omnidirective pattern of radiation. The only real solution to this problem would be to avoid it by locating the cable inside of the radiating conductors. Furthermore, it would be advantageous to use the outer conductor of the cable also as the radiator. It happens that there is a way to do this. The solution of the problem seems to be little known, although it appeared in a German patent application that was issued in U.S. 17 years ago. The design to be described employs the same principle with further improvements.

Fig. 1 shows a structure that solves this problem with an easy construction and some advantages in performance. It is a series of sections of solid-dielectric coaxial cable transposed at every junction. Each section is a half-wave length in the cable (½ wavelength in feet). This length and



Vertical antenna structure and dimensions.

Fig. 1

the transposition causes every gap to be excited from the cable in the same polarity and phase, as indicated on the diagram. On the outside of the cable, the wavelength is longer because the principle dielectric is air, so each section is substantially less than a half-wavelength on the outside (perhaps 1/3 wavelength).

The current on the outside is in the same phase along the length. Its variation is greatly reduced by making the sections shorter than ½ wavelength on the outside. The result is a radiator having practically the properties of a long wire carrying uniform current of the same phase along the wire, which is the ideal for the present requirements.

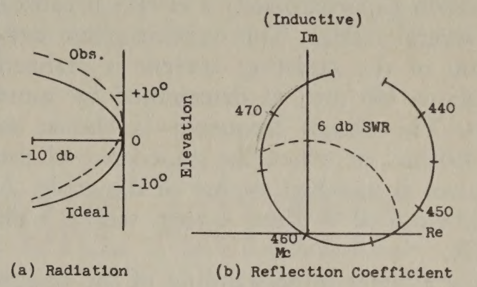
At the center of each section, the voltage is zero and the current is maximum. The end sections are arranged to preserve this pattern. At the voltage node at the low end, there are two or more radial quarter-wave spokes (or a disc of this radius) to act as a non-radiating ground connection. At the top, the last section is continued for a quarter-wave distance above the highest voltage minimum, to act as a radiating ground connection.

For protection from nearby lightning discharges, the two conductors of the cable are joined by a quarter-wave stub inside the top section. This has no appreciable effect on the normal operation.

The entire radiating assembly is mounted in a tube of insulating material. The space between the cable and the tubeing is filled with foam or wax for support and for sealing against moisutre.

The first antenna designed by these principles had 8 gaps, which means 7 sections plus 2 half-sections plus the extra quarter-wavelength added at the top, the total being equivalent to 8.5 sections. It was designed for 460 mc. and the radiating length was 2.9 wavelengths (about 76 inches). The wave shield at the bottom was made of 3 radial spokes. The enclosure was a long fiberglass tube with wax filling. The amount of dielectric outside the cable had an appreciable effect, which happened to give a closer match to the cable impedance.

Fig. 3 shows the performance of this design. In Fig. 3(a), the solid curve shows the theoretical radiation pattern in elevation, while the dotted curve shows the observed pattern. In Fig. 3(b), there is plotted on the reflection chart the impedance locus as seen at the nearest (lowest) gap in the 50-ohm cable.



(a) Radiation (b) Reflection Coefficient

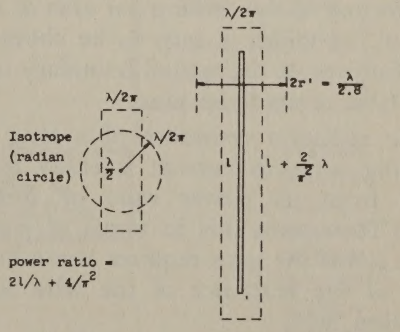
Gain = 8 db over isotrope = 6 db over λ/2 dipole.

Performance of antenna for 460 Mc.

Fig 3

The performance involves a slight compromise between the greatest horizontal gain and the least reflection in the cable. The effective length of the sections is slightly greater than a half-wavelength in the cable, which happens to cancel out the total inductive susceptance. The cumulative phase shift from the excess length causes a slight upward tilt of the pattern (about 3 degrees) which is hardly appreciable. The formula in Fig. 4 gives a directive gain of 8 db over an isotrope or 6 db over a half-wave dipole, and this is approximately realized in the design.

On the reflection plot, the impedance



The wave-interception area of a long wire.

Fig. 4

variation (approximately a circle) is caused by several factors. The constant-phase condition of the radiating current is realized at about 440 mc., as determined by some tests. The design frequency is chosen to be 460 mc., at which the impedance of the radiator is matched to that of the cable. A bandwidth of ± 5 mc. is then within 5 db SWR.

For a better understanding of the design considerations, there will be presented a brief outline of the theory and a few design formulas.

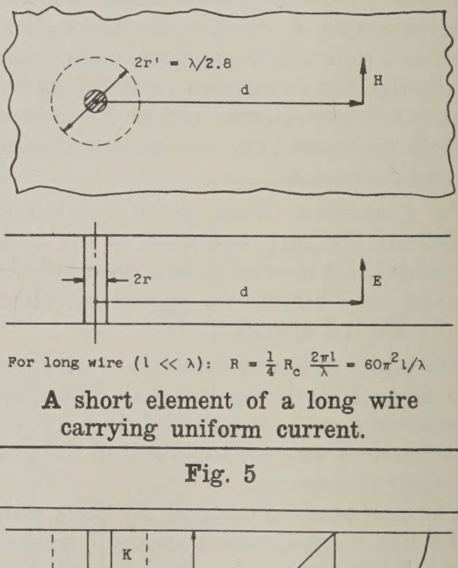
The radiation pattern of a straight wire carrying uniform current is one of the simplest to compute. This pattern has been integrated to give the power ratio of directive gain, which may be expressed in terms of the wave-interception area of the antenna. Fig. 4 shows for comparison the area for an isotropic radiator and that for the long wire. The former, which is taken as a reference, is a radiancircle, or may be represented by a rectangle having a width of one radian-length (½ wavelength x 3.14) and a length of ½ wavelength. The latter is a rectangle having a width of one radian-length and a length slightly longer than the wire. The ratio of these areas is the power ratio of gain. The simple formula given is valid (within ± 0.1) if the length of wire is at least one wavelength, or the ratio is at least 2.4 (about 5 db). (Within these limits, it is also valid for a colinear array of halfwave dipoles, end-to-end). If it is desired to compare with the half-wave dipole as a reference, this has a ratio of 1.64 (2.15 db).

Referring to the rectangular area of interception, its width is seen to be about half the diameter of the virtual boundary of the near field around the wire.

The radiation resistance of a long wire carrying uniform current is easily formulated from its power ratio of directive gain. To express this in terms of conductance across the gaps requires also a knowledge of the reactance of the wire in the radiation field.

Fig. 5 shows a basis for formulating both resistance and reactance. It is assumed that the wire is infinitely long so the radiation takes the form of a cylindrical wave. Then the field is that of a short element of wire in a perpendicular position between a pair of parallel planes. The solution of the cylindricalwave equations now gives both resistance and reactance. The resistance is given by the simple formula shown, and is proportional to the length of wire. The reactance is that which would be computed for the inductance of a wire enclosed by a coaxial shield of the diameter shown in dotted lines. Hence this cylindrical surface is denoted the "virtual boundary" of the magnetic field. It has a radius of about one radianlength (½ wavelength x 3.14). These relations are valid for a wire much smaller than the virtual boundary; then the resistance approaches a limiting value for a small wire and the reactance depends on the wire radius in the usual manner.

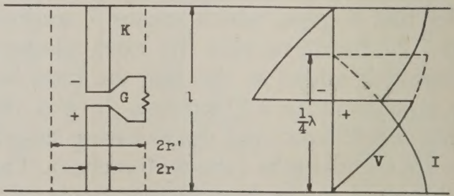
The present antenna structure, if extend-



For long wire ($l << \lambda$): $R = \frac{1}{4} R_c \frac{2\pi l}{\lambda} = 60\pi^2 l/\lambda$

A short element of a long wire carrying uniform current.

Fig. 5



$r' = \lambda/5.6$; $R_c = 377$; $K = \frac{R_c}{2\pi} \ln \frac{r'}{r}$

$$G = \frac{R_c}{4K^2} \frac{\lambda}{2\pi l} = \frac{1}{240} \frac{\lambda}{l} \frac{1}{(\ln r'/r)^2}$$

$B = \frac{-1}{2K \tan \pi l/\lambda}$ (shunt inductance)

The radiation admittance at one gap.

Fig. 6

THERE WILL BE FEATURE ARTICLES IN THE NEXT ISSUE OF COMMUNICATION HORIZONS WHICH YOU CANNOT AFFORD TO MISS

TURN THIS CARD OVER

FIRST CLASS
Permit No. 309
MODESTO, CALIF.

BUSINESS REPLY MAIL
No Postage Stamp Necessary if Mailed in the United States

Postage will be paid by

COMMUNICATION HORIZONS MAGAZINE
P. O. Box 3206
Modesto, Calif.

HOW MUCH CAN YOU AFFORD?

Has your two-way radio business enabled you to visit Nassau this year? Do your 807's have gold plate caps? Do you use RG-19/U? If you can afford this—good! But

CAN YOU AFFORD TO BE UNINFORMED?

Probably not, not many people can.
For the paltry sum of $4—the price of a 2E26 (without gold plate cap) —you can command to be brought forth upon your premises each month for the next year, an issue of COMMUNICATION HORIZONS, the professional communications magazine.
A look through this issue will give you the best possible idea of what you will receive in each issue. Information you require on latest technical advancements, FCC regulations, new products, what your competition is up to, everything you could possibly want to know about two-way communications today!
If you send in the attached card today, enclosing $4, you may be able to take advantage of our special bonus-issue offer which will give you up to 3 free issues of the magazine. If you rather that we bill you for the $4, just rip the card from the magazine, fill it out and fling it into the nearest mailbox (no stamp needed) — we will place you on your regular 12-issue subscription list (bonus offer available only when payment is enclosed with form). Send!

Communication Horizons, P.O. Box 3206, Modesto, Calif.

Sirs:

Please start my subscription to COMMUNICATION HORIZONS with the November issue. (check one)

- ☐ **Enclosed $4 for 15 issues. I am mailing this before November 7.**
- ☐ **Enclosed $4 for 14 issues. I am mailing this before November 12.**
- ☐ **Enclosed $4 for 13 issues. I am mailing this before November 21.**
- ☐ **Enclosed $4 for 12 issues. I am mailing this before November 26.**
- ☐ **Please bill me $4 for 12 issues.**

Name______________________________, **Title**____________

Organization ____

Address ____

City____________________________, **Zone**________, **State**________ ed to an infinite number of sections, has image planes where conducting boundaries may be located for analysis. Fig. 6 shows one section between two planes, with one radiating gap in the center. The sinusoidal waveforms of current and voltage are shown. Each half-section is 1/4 wavelength inside the cable, or about 1/6 wavelength outside. The voltage is balanced to ground. The current is nearly uniform. The radiated power is determined by the average current and the radiation resistance of the length of one section.

$$R' = \frac{2\pi K^2}{k R_c} \frac{\lambda}{l'} = \frac{60}{k} \frac{\lambda}{l'} (\ln r'/r)^2$$

$$l'/\lambda = \tfrac{1}{2} (\text{power ratio} - 0.4)$$

$$r/r' = \exp - \sqrt{\frac{k\ R'}{60} \frac{l'}{\lambda}}$$

n = number of gaps
$l' = nl$ = total length
$R' = 1/nG$ = resistance of all gaps in parallel
k = dielectric constant in cable
$l = \lambda/2\sqrt{k}$ = length per section

Design formulas based on the resistance of many gaps in parallel.

Fig. 7

The relation between current and voltage at the gap is computed on the assumption that the wire behaves like a coaxial line in the virtual boundary. This has some logical basis, which has been developed by Schelkunoff. The wave resistance of such a coaxial line is denoted K and is given by the usual formula shown.

Now the radiation can be reduced to an equivalent conductance G across the gap. Also the reactance of the wire is reduced to a parallel susceptance B. Both are given by the simple formulas shown, for each gap. The approximations are good for a wire of several wavelengths.

The antenna presents to the connecting cable the resistance of all gaps in parallel. Fig. 7 shows a formula for this resistance (R′). In this formula appears the dielectric constant (k) of the cable, since that affects the length of each section. It is noted that this dielectric constant reduces the antenna resistance. For a moderate number of gaps, there is some difficulty reducing the antenna resistance to a value near the cable wave resistance; the dielectric constant in the cable is helpful in approaching this condition.

Another formula on Fig. 7 gives the total length required for a specified power ratio of gain, based on Fig. 4.

The last formula on Fig 7 gives the wire radius required for a specified value of the antenna resistance. The wire is much smaller than the virtual boundary if the length is several wavelengths.

The susceptance of the gaps may be tuned out by shunt capacitance.

The formulas have been checked against the design described for 460 mc. The computed radiation pattern and gain are in fair agreement with the tests. The computed antenna resistance is 100 ohms; this is roughly verified at about 440 mc., the frequency at which the gaps are excited in the same phase. The shunt susceptance is partly canceled by the dielectric of the housing; it happens that this dielectric has little effect on the radiation conductance at each gap. The antenna impedance varies with frequency in the manner of a length of cable with lumped loading and complete reflection at the far end. At 460 mc., the impedance moves to about 50 ohms, which matches the cable. To the extent of avilable tests, the simple theory of radiation and circuit behavior is verified. This gives a presumption of quantitative validity to the philosophy of theoretical derivations.

The antenna described is regarded as a major advance in obtaining the greatest gain for its size, with the simplest construction.

This type of antenna has been developed for Communication Products Co. of Marlboro, N.J.; their chief engineer, William B. Bryson, has contributed much to the ideas and the method of construction for production. Also it is a pleasure to acknowledge the contributions and engineering services of my associates.

References

(1) A. A. Pistolkors. "The radiation resistance of beam antennas", Proc. IRE, vol. 17, p. 562-79, Mar. 1929. (The classic paper on mutual resistance between half-wave dipoles

(Continued on page 19)

POST CONVENTION REPORT

"AN ANALYSIS IN PICTURES"

In the October Communication Horizons Washington Bureau Chief Robert E. Tall reported on the events which took place in Dallas, Texas during the 13th annual convention of the National Mobile Radio System. Photographic coverage of the meeting, provided by Clayton E. Niles, NMRS Executive Secretary, arrived after the October report had gone to press.

A total meeting registration of 110 NMRS delegates refused to allow the wind and rain of one of the most violent hurricanes of this century to dampen their enthusiasm. Aside from adopting a new industry 'moniker' (the NMRS voted to call themselves *Radio* Common Carriers as opposed to *Miscellaneous* Common Carriers), the NMRS group brought themselves up to date on such matters as 'standard contracts' offered by Bell System Companies for interconnection, and the advantages and disadvantages of state regulation as was recently adopted in California).

NMRS Board of Directors

Seated, left to right—A. J. Spooner, Oklahoma City, Oklahoma; Malcolm Moses, Farmington, N.H.; Donald Cook, Fresno, California; James Colgan, Boston, Massachusetts.

Standing, left to right—Alpheus Stakely, Atlanta, Georgia; Victor Piscitello, Lawrence, Massachusetts; Robert Crabb, Los Angeles, California; Ralph Hicks, Tulsa, Oklahoma; Kay Kelso Kidd, Bakersfield, California; Larry Bush, Waco, Texas; and Frank Chalfont, Palm Springs, California.

Not shown—Charles Holst, Chicago, Illinois and Jess Peters, Hammond, Indiana.

As with any meeting which deals with the intricacies of regulated communications, the FCC was ably represented. Attending from Washington was Arthur Gladstone, Chief, Domestic Radio Facilities Division, of the Commission's Common Carrier Bureau. During his turn on the speaker's rostrum, FCC man Gladstone revealed he will be serving as the personal attorney to FCC Commissioner Robert E. Lee.

Gladstone discussed rule changes and application problems peculiar to RCC operations. According to Gladstone, the new rule which requires a 30 day public notification prior to staff action on *any* application and which in turn make impossible the Commission acting on any applications for STA (special temporary authority), making it doubly important that RCC's anticipate their needs for changes, modifications and additions well in advance of the time such needs must be effected.

The division chief stated that new protest provisions of the rules have encouraged an avalanche of protests and warned that

(Continued on page 19)

P. M. Freeland

International Crystal Company, Oklahoma City addressed the membership.

Arthur Gladstone, FCC

A long time friend of the NMRS gang revealed his new position with the Commission.

It's HORIZONS AWAY!

—with

STATIONMASTER®
Base Station Antenna
Cat. No. 200-509

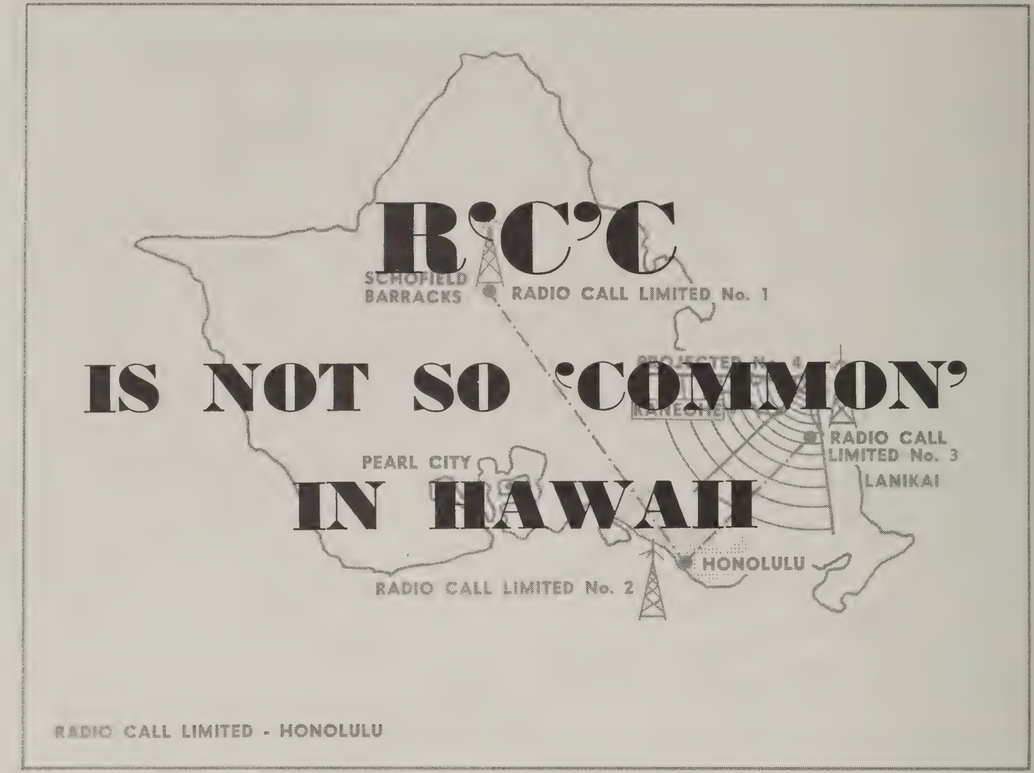
FREQUENCY RANGE	144-174 Mc
OMNIDIRECTIONAL GAIN	5.8 db
MAXIMUM POWER INPUT	500 watts
NOMINAL INPUT IMPEDANCE	50 ohms
BANDWIDTH	± 0.3%
VSWR	1.5:1
RATED WIND VELOCITY	100 MPH
WEIGHT	30 lbs.
ELEMENT HOUSING LENGTH	19′

SINCE 1933

Communication Antenna Systems for American Business

Communication Products Company, Inc.
MARLBORO • NEW JERSEY

R'C'C IS NOT SO 'COMMON' IN HAWAII



Late in August Communication Horizons transported Special Assignments Editor Ken Bostick to the 50th state to look into the aggressive RCC operation run under the guidance of Bob Miller, Honolulu.

Miller's "Radio Call Service, Ltd." offers two-way business communications to the people of Hawaii in a manner worthy of note by other RCC operators throughout the United States. Editor Bostick's report follows.

Armed with my camera, notebook and filebook of RCC data, I walked into Miller's Radio Call office on Kapiolai Blvd. looking for the world like the tourist I was not.

I found Robert Miller (he was at the time the outgoing President of the National Mobile Radio System) talkative, well versed on this business of operating a commercial two-way radio system, and extremely opinionated.

Miller did the talking . . I just took notes.

"When my wife and I assumed ownership of Radiocall Service Ltd. in April of 1959, it soon became apparent that we had not purchased much more than a license. Our mobile fleet numbered a majestic five units and fewer than 50 pocket receivers in varying stages of dis-repair. We would shudder regularly, four or five times a day, upon noticing the approach of a customer, receiver to his ear, wearing a puzzled if not disgruntled look on his face.

"We soon learned to manage a sickly smile while swapping him a receiver of even more ancient vintage, hoping he'd stay away for at least a week before repeating his visit to our station.

"We also made several other interesting discoveries, after we purchased the business. The two-way base station, licensed for a 30 watt clunker which would have better been on display at the Smithsonian, had in actual service a 250 watter which no longer appeared on the Commission's 'type-accepted' list! We not only were on the air with questionable signal, we were illegal!

"A second base station site was non-existant; the plan had been to erect an antenna system at a private home, but the agreeable owner had long since sold the property and the project shelved.

"A third base station had magically moved about a half-mile south of its official FCC designated location.

"And our one-way paging transmitter!

Radiocall Service Ltd.

Bob Miller points out his audio control console, "flat across the spectrum."

Oh . . . it was operating all right . . . but only barely. Someone had attemped to redesign the unit, and how it survived this attempt only it knows. We soon discovered that is was operating under a temporary developmental grant which promptly expired like a wounded eagle shortly after our arrival.

"With so many errors and blunders on the part of the previous owner, we did not quite know where to begin. Everything seemed important, and everywhere we turned we ran into complaints, mis-filings, pleas for service and some outright hostility.

"So we began the slow job of rebuilding. A task that would have been easier if we could have truly begun from scratch, with out the problems of rebuilding. Through the astute guidance of counsel in Washington (who reported back later he had never seen an MCC license in quite such delapidated shape!) and a lot of long hours and hard work on our part, new equipment was placed on the line, the base station relocated for far superior coverage, and existing equipment "remodified" back to the original factory schematics.

"There are two major factors which make Honolulu a peculiar and rather difficult market in which to sell two-way communications. One is socio-economic, the other is physical. The concept of using two-way radio is one's business, and the willingness to pay for this service, is just now becoming an accepted way of commercial life. Second, the mountainous terrain of the Island of Oahu creates serious system-design problems. We now operate three two-way base stations to assure coverage in every commercial center on the island and useable coverage on 95% of the land area. A second radio paging station is now under CP to extend the one-way coverage area to the same limits.

"Our Station control equipment has been designed and built in our shop to the standards of the broadcast recording industry. All speech input circuity is flat from 40 to 15,000 cycles and is equalized to compensate for telephone line losses between the control point and the base station to appear at the transmitter input terminals "flat" between 50 and 10,000 cycles. Our attention to audio quality is based upon the fact that the radio user in the field judges the performance of his radio set primarily on how it *sounds*. To refer to microvolts, decibles, etc. is just so much gobbledegook to the customer-his *ear* tells him if he likes it or not!

"Too many RCC owners are content to buy off-the-shelf equipment and accept mediocre audio quality, rationalizing that it *has* to sound that way because of the 300-3000 cycle limits imposed by the Commission. They overlook the fact that hi-fi in sound is obtained in *balance,* not band-pass, in the speech range of the audio spectrum. The difference is especially striking to existing Business Radio licensees when our system is demonstrated for the first time-to a man, they remark on the "fullness" of our sound, and begin thinking seriously of changing their crystals to our frequency! Sound, you see, can sell our product, for after all, in the final (speaker) analysis, sound is *all* that we are selling!

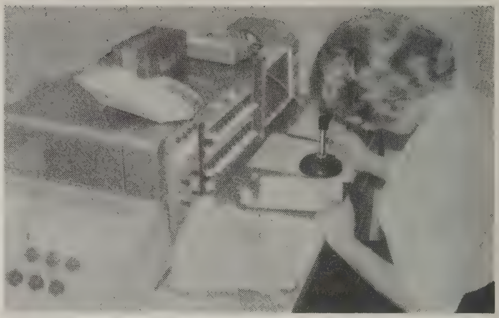
"The polyglot racial extractions of our Hawaiian people have resulted in a distinctive pidgin-English which can be almost unintelligibleto the causal visitor to our islands. My wife is French, and in the early days of our operation, was completely dumfounded by the intricacies of pidgin-English used by our two-way customers. To show how well integrated we have become, she now handles traffic in pidgin, even "translating" car-to-car conversations which become to dialectic for the customers themselves! In her two years of radio operating, she's developed a real ship's operator ear that can copy traffic through noise and interference like a veteran, and she now has her ticket on the station wall to prove her skill.

"Our duty roster, although small, keeps everyone's day full. Bob Root, formerly an FAA controller, is our Sales Manager. He knows what radio can and cannot do for a prospective customer, and gives full attention to analyzing the man's problems thoroughly rather than signing him up to a flock of gear which may bounce a month or two later.

"Jack Huntington (Amateur KH6AWS) is our technical department . . and he's the *whole* department! He manages to keep plenty active since we fabricate all of our own audio and control circuits. Although he's been known to groan occasionally when we have to install a mobile in the afternoon heat, I'm always there to remind him that the tourists are paying fifty bucks a day to enjoy the magic of the gorgeous Hawaiian sushine and he's getting it free!

"Renee has the demanding and time consuming job of keeping our books in order, typing my correspondence and maintaining our home at the same time . . . as she is dispatching our pidgin-talking customers. She is studying for her phone ticket, is an accomplished Heathkit builder and is presently constructing a "Silence Sensing" circuit for our paging stations which will sound an alarm at the control point when modulation is interrupted for more than a prescribed length of time.

"My job is to oversee the engineering aspects of our operation, try to devise new ways of building our list of subscribers, and handle the flow of written material pertaining to the Federal Communications Commission. Our licenses are now in order everything "talks" but there are still many areas of progress as yet unexplored.

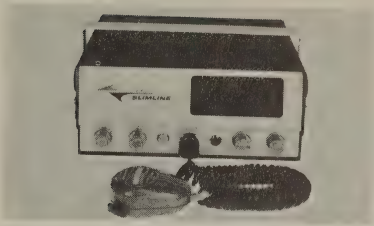


Control central at Radiocall Ltd.

"If I were called upon to discuss one thing we've learned in our two and a half years, it would be this: "Never accept a manufacturer's advertising claims at face value without subjecting the equipment to exhaustive tests in the same area in which it's to be used. The manufacturer has one goal, and that is to sell equipment. Our goal is to provide reliable-continuous communications. The two goals are not always arrived at from the same direction, nor may they always be achieved along a common path."

WELL . . . said this reporter after a series of interview sessions with Miller . . . "this man certainly has a great deal to say!" Aside from Miller's energetic personality and extreme pride in workmanship, we noticed a few other important things about the man. Despite the fact that he is the furthest west RCC operator in the world (at least from our mainland vantage point), his RCC service differs only slightly from those along the west coast of the mainland, and only slightly more from those 5,000 miles east along the Atlantic seaboard. He likes to run frequency checks on mobile units every 90 days, and he maintains complete check out schedules on his base units once every 30 days. If he services an installation on contract, it's $7.50 per month per mobile, $10.00 per month per base. Should the customer prefer his talents on a piece meal by-the-hour basis, Miller charges out time at $5.75 per plus parts. His main line is General Electric equipment, although he sells COMCO gear to those sold on this line.

A number of units in the Honolulu area



MORE POWER: For greater range, full saturation coverage. PRICE: Lower than the price of lower-powered equipment. No other system has as much power, more features, or more sensible optionals. NOTE: If you have mobile FM radio in the 10-30-watt category, the 100-watt amplifier alone will boost your power to full 100-watts. For free descriptive literature, write today: Aeronautical Electronics, Inc., P.O. Box 6527, Raleigh, North Carolina.

AEROTRON

A TALE OF TWO TICKETS

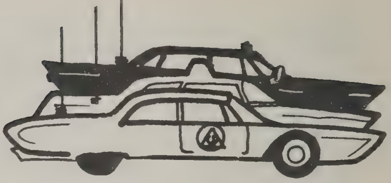
SPECIFICATIONS
AEROTRON SLIMLINE
100-watt Mobile FM Radio

1. **FULL 100-WATT OUTPUT** (Only VHF 100-watt system available)
2. **INSTANT SELECTION OF NORMAL OR HIGH POWER OUTPUT** (Only unit offering this feature)
3. **LOW BATTERY DRAIN** (Has standby power-saver switch)
4. **TRANSISTORIZED POWER SUPPLY**
5. **2 OR 3 CHANNEL OPERATION***
6. **UNICALL*** (to guard against unwanted signals on same frequency)

*OPTIONAL

*Complete VHF system including antenna and other standard accessories. Also available in low-band $615. Amplifier alone $250. Prices slightly higher west of the Rockies.

PUBLIC SAFETY COMMUNICATIONS



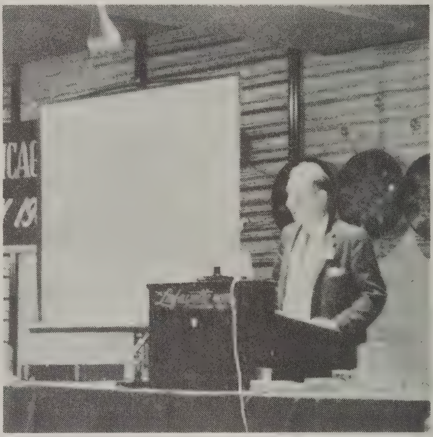
Material Prepared and Submitted by
ROBERT E. BROOKING
Communications Engineer
City of Burbank, California

A discussion of problems created by the split channel dockets and the efforts of the licensees in the Public Safety Radio Services to conserves radio spectrum space was scheduled this month. However, certain matters now before the Federal Communications Commission are deserving of immediate attention because of time and importance.

The first of these is Docket 13971; In the Matter of Amendment of Part 10 of the Commission's Rules to make the frequency 39.06 mc. available to the Local Government Radio Service for control of traffic lights by mobile units installed in emergency vehicles. APCO did not argue the merit of such a service as a general matter; but it did object to the proposal to take a frequency from the Police Radio Service for this purpose. Objection was also made to the 32 kc. bandwidth requirement of the device.

As a result, the company supplying the equipment modified their design so that the device could be operated within the 20 kc. bandwidth allowed under the narrow band standards. A Further Notice of Proposed Rulemaking was issued by the Commission covering the change to 20 kc. bandwidth. Consultations were held with various groups, the Public Safety Radio Users. Afterward, comments were filed by the Associated Public-Safety Communication Officers, Inc, (APCO), the International Association of Chiefs of Police (IACP), the International Association of Fire Chiefs (I-AFC), and the International Municipal Signal Association (IMSA).

The decision of the Commission has not yet been announced but it is encouraging to note that there was consultation and coordination on the part of several Public Safety Radio User Groups.



Column Editor Robert Brooking made his report on APCO activities in the FCC Docket field during 1960-1961 at the Long Beach APCO Conference.

The second item is Docket 14229; In the Matter of Fostering Expanded use of UHF Television Channels, released August 3, 1961. Perhaps the first reaction of both the Communication Administrator and the Television Station owner or manager would be, "Why should licensees in Part 10 be concerned with assignment of Television Channels?"

In this column last month, the subject of conservation of the radio spectrum was discussed. Reference was made to the statement of dissent by Commissioners Bartley and Lee in Docket 11253. We again quote from this statement of dissent, "A further example of the problems created in the inefficient utilization of valuable portions of the spectrum brought about as a result of insufficient evaluation of the requirements on a long term basis of the various services. Thus, the 72-76 mc. band, which lies between Channel 4 and 5 in television, has, in effect, been limited in its future efficient utilization. It is too narrow for television and, because of the susceptibility of television receivers to interference, it will be severely limited for other uses."

"A further complication may be created in connection with even the 'temporary expedient' here proposed. This action is merely a further commitment of this portion of the spectrum to the land-mobile services—insufficient, in our opinion, to accomodate their rapid growth for any substantial period of time. It is contemplated that considerable expenditures may be required for the acquisition of the necessary equipment to operate on these narrower channels. The proposal permits the amortization of existing equipment over a period of year. Therefore, it becomes apparent that attempts in the future to effect an overall reallocation will be faced with an obstacle of increased magnitude."

On June 26, 1956, the Commission released a Report and Order in Docket 11532; In the Matter of Amendment of Part 3 of the Commission's Rules and Regulations Governing Television Broadcast Stations. Two paragraphs are quoted from this lengthy document: "The conditions of use and the characteristics of radio systems employed by the land mobile services indicate that the lower VHF spectrum may well be adapted to their needs. Many of these services are related to trading areas in much the same manner as the broadcast service. Thus they have need for substantially the same coverage areas. However, only the base transmitting and receiving antennas can be raised above rooftop and treetop levels, and in general, the base station uses lower antennas and lesser powers than broadcast stations. The governing factor, however, is the severely restricted powers and antenna heights which are available to mobile units. Only in exceptional cases do they operate from clear sites, and it is imperative that for longer ranges they have frequencies suited to their needs. The lower VHF frequencies are less affected by hills, structures and vegetation. They also permit longer mobile antennas and more sensitive receivers. These factors indicate the desirability of considering the allocation of lower VHF frequencies to the land mobile services.

"It is evident that the need and demand for more accomodation for land mobile services has been increasing substantially in the recent past and promises to increase further as the industrial use of radio continues to develop. These factors raise basic questions concerning spectrum allocation which go further than the requirements of television broadcasting alone, and which take into account the rising needs of other services. Thus the question of the transfer of television broadcasting to UHF has the dual aspect of the possible improvement it may provide in the opportunity for achieving the goals of the nationwide television system upon the one hand, and of accomodating expanding needs and requirements of industry on the other."

A statutory inquiry has been held by the Commission looking toward a general reallocation of the spectrum between 25 and 890 mc. (Docket 11997). Almost all users of the radio spectrum participated in this hearing including representatives of the Police, Fire, Forestry Conservation and Local Government Radio Services.

Colonel Charles W. Woodson Jr., Superintendent of the Virginia Department of State Police, summed up the situation very well when, at the conclusion of factual testimony, he stated, "Those of use directly involved in the difficult job of law enforcement and protecting lives and property do not represent a profit-making organization. We are not asking for the use of radio in order to make a higher profit, or simply to make our work a little easier. Frequently our work requires the sacrifice of life. As we see it, any modern tool that becomes available and that will make our performance of this job less dangerous and more effective ought to be made available to us. If there is to be a choice between accomodating the needs of the police and accomodating the needs of many other services desiring radio, but not having comparable responsibilities, we see only one answer: Those charged with responsibilty for public safety, for law enforcement, for the apprehension of criminals must be accomodated first."

Unfortunately, the representatives of the various Public Saftey Radio Services did not coordinate their respective cases. Likewise, other services presented facts concerning their needs for more spectrum space but each represented a separate view which in the aggregate did not eliminate the possibility of moving channels from one land-mobile service to another. Only Mr. William Whiting, witness for the State of California Communications Advisory Board, Mr. Robert McNutt, representing the American Municipal Association and the writer of this column appearing for APCO, had the audacity to suggest that Public Safety should be considered before Public Entertainment. Now we have yet another Docket (14229) which discusses the possible need to continue an 82 channel TV system using the present 12 VHF channels. It proposes adding stations in VHF by the "drop-in" process. Further, it completely ignores the fact that the Safety and Special Services have a compelling need for additional spectrum space.

During the last six years we in Public Safety as well as other users of two-way radio have witnessed the fragmentation of our channels into 15 kc. slices, often of no value in large metropolitan areas because their use would create harmful interference to existing systems. Their may be some services which prefer the interference 15 kc. off frequency; there are no more channels available so it is less an evil than co-channel interference. To the Public Safety Licensee, this is not the case. His is the responsibility for safety of life and property. The police officer in need of help may never have a second chance to call for assistance because his first call was covered by interference, whether the interference was by a system 15 kc. removed or by another user on the same frequency. Nor can we assume that the Commission and other users will take the attitude that the Public Safety Radio Services are in a class apart, protected by sacred decree. Indeed, we already have comments filed in two dockets which suggest that "idle police frequencies" be reassigned to other services. Perhaps this same organization would propose that "idle firemen" be dropped from the city payroll, thereby saving taxpayer dollars because there are no fires to put out at the moment.

But this discussion has become academic. *What can be done to solve the frequency shortage existing among all services other than Television Broadcasting?*

First, obtain a copy of Docket No. 14229. You may obtain a copy by writing to Commissioner Robert E. Lee, Federal Communications Commission, Washington 25, D.C.

Second, get out your copy of Communication Horizons for June, 1961, and turn to Page 4. Read the article titled, "WHAT ABOUT THE VHF-TV BAND?" If you don't have a copy, find somebody who does —perhaps Bob Cooper will have a worn copy or two in his desk.

Third, get together with others who have administrative responsibility for systems in the Safety and Special Radio Services. Some of them have prepared comments to the Commission in the past. They will be glad to help put them in proper form.

Fourth, what do you want? *More spectrum* space! How do we get it? Request that the issue in Docket 14229 be enlarged to include the fact that the Safety and Special Radio Services need more spectrum space and that this fact should be included in any action taken. Request that no more VHF-TV grants be made pending a report and order by the Commission in this matter and in Docket 11997. Request that in areas such as the San Joaquin Valley where VHF-TV is not being used, the Commission make this space available to other services such as the various Safety and Special Services.

Fifth, file with the Commission by December 4, 1961 (the October 2 date has been extended) an original and 14 copies. Don't forget to give the facts. The Commission can do the job for us only if you provide the ammunition; in this case, documented evidence—not just idle claims.

R.E.B.

THREE

SY-PEP PAPERS

are in this issue of Communication Horizons. Have you submitted your SY-PEP paper yet? See page one for full details.

SPLATTER

(Continued from page 1)

single paper received in the "Systems-Practical" category.

Mr. John D. Cupp, The Andrew Corporation, Chicago, Illinois presented a paper entitled "Microwave Reliability" which fell into the "Equipment Development-Practical" category.

As the three papers received fell into three separate categories, no papers can rightfully be judged "Best of Category" for the judging period.

The "Best Paper of the Quarter" award and a check for $100.00 is on its way to author Robert F. Lewis, a Vice President at Prodelin, Incorporated, Kearny, New Jersey.

Additional SY-PEP papers for the second quarter judging period appear in this issue of Communication Horizons. The second quarter judging period ends December 15th. Have you begun drafting your SY-PEP paper? Full details are available on pages 1 and 2 of the August CH, and if you haven't a copy available . . . a letter to this desk will speed one by return mail.

RBC

A VERTICAL ANTENNA MADE OF TRANSPOSED SECTIONS OF COAXIAL CABLE

(Continued from page 7)

in array; Table A includes colinear case; 73.29 ohms should be 73.12 but rest of table is still the best available.)

(2) P. S. Carter, "Circuit relations in radiating systems and applications to antenna problems", Proc. IRE, vol. 20, p. 1004-41, June 1932. (Colinear half-wave dipoles, formulas and curves.)

(3) W. Moser, H. E. Paul, "Antenna System", U.S. Patent 2158376, Apr. 28, 1936 - May 16, 1939. (Colinear array of half-wave dipoles made of transposed sections of coaxial line, said to be already known.)

(4) J. A. Stratton, "Electromagnetic Theory", McGraw-Hill, 1941. (Cylindrical Waves, p. 355-61; colinear half-wave dipoles, p. 446-8.)

(5) S. A. Schelkunoff, "Electromagnetic Waves", Van Nostrand, 1943. (Cylindrical Wave impedance, p. 260-3.)

(6) A. Alford, "Long slot antennas", Proc. Natl. Electronics Conf., vol. 2, p. 143-55, 1946. (Formula for the directive gain of a linear array with uniform current along its length.)

(7) H. J. Rowland, "Antennas for citizens radio", Electronics, vol. 21, no. 5, p. 96-9, May 1948. (Colinear external radiators mounted on outside of coaxial line, series feed from gaps in outer conductor of line.)

(8) E. C. Jordan, "Electromagnetic Waves and Radiating Systems", Prentice-Hall, 1950. (Wave resistance and reactance of a long wire carrying uniform current, p. 373-5.)

(9) J. D. Kraus, "Antennas", McGraw-Hill, 1950. (Colinear half-wave dipoles, curves, p. 269; Pistolkars table, p. 271.)

(10) S. A. Schelkunoff, H. T. Friis, "Antennas - Theory and Practice", Wiley, 1952. (Straight wire with uniform current, p. 191; same, also colinear half-wave dipoles, p. 597; wave impedance of long wire, p. 232-5, 427-8.)

POST CONVENTION REPORT

(Continued from page 8)

Past President Miller

Robert W. Miller, Honolulu RCC operator addresses "his people."

more hearings would ensue which will delay the application-grant processes even more.

Photographs are courtesy of NMRS photographer Clayton E. Niles, Tuscon, Arizona.

DANGER TEFLON

Skip Yem
A. W. Weart Brothers Co.
Palo Alto, California

The use of Teflon sockets, flanges and insulating blocks in radio frequency gear is becoming more common as manufacturers strive to improve efficiency and increase operating ranges. Teflon as an insulator is unbeatable. It is also dangerous.

Recent laboratory use of Teflon has revealed that under circumstances of great heat or flame Teflon gives off a very toxic gas, perfluoroisobutane. This gas is exteremly toxic and in a confined area a threat to personnel working around the equipment.

Tests have indicated that the toxic decomposition of Teflon does not occur below 400 degrees(C) and no ill effects have been reported by individuals exposed to Teflon heated below this temperature.

Since Teflon is used commonly in improved VHF and UHF communications equipment(most Teflon uses in communications gear is limited to tube sockets), technicians and engineers should be forewarned!

In the case of fire within the communications equipment, or in a building housing communications equipment, extreme caution should be taken when working in the region of the blaze. Do not dispose of Teflon parts in the usual manner of waste material, i.e. do not place parts in incinerators.

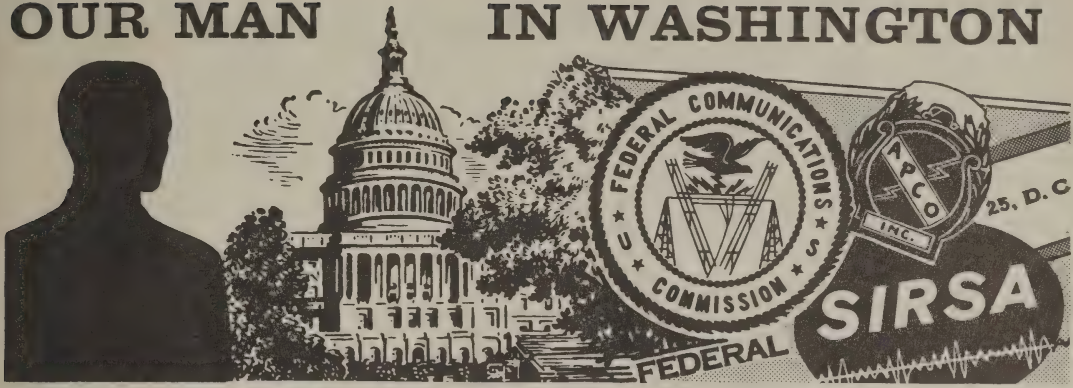
Teflon fumes inhalde can cause serious injury to your nervous system, and even death. In one laboratory case on record a technician laid a cigarett down on a Teflon part, and later picked it up to continue smoking. The cigarette had become contaminated with enough Teflon material to cause the employee to become violently ill and later to die from edema of lungs caused by the decomposed Teflon.

In the event of a flash fire where Teflon parts are in use, extreme caution should be taken to protect personnel from exposure to decomposition products of the material. When a flash fire has occured, the area in the immediate vicinity should be evacuated immediately. Technicians and engineers should be instructed not to re-enter the area until sufficient time has elapsed to permit thorough ventilation of the area. Also, personnel engaged in the repairs of equipment after a flash fire has occured should be extremely cautious while removing parts so as to avoid contact with even the minutest quantities of the decomposition products of Teflon.

Finally, all persons handling Teflon parts should wash hands thoroughly with heavy duty soap and water as soon as possible to avoid contamination of the mouth and digestive system, due to any Teflon residue on hands.

S.Y.

OUR MAN IN WASHINGTON



Manager of Communications Horizons' Washington Office, Robert E. Tall, reports on the past month's communication activities

Commission Proposes Use Of TV Channels

An early stage plan which would provide one of the biggest breaks for public safety, land transportation, industrial and common carrier radio interests since the FCC first established frequency allocations for their use has been unveiled by the FCC.

The plan . . . to derive 34 channels of highly desirable land mobile frequency space in each area where the FCC carries through on VHF television deintermixture proposals . . . is far from sold, however, a majority of the Commissioners have rejected its adoption as an FCC proposal several times in the past.

The almost proposal, spearheaded at the Commission level by Commissioner Robert E. Lee, would make use of a little more than one megacycle in each VHF television channel withdrawn by the Commission for non-broadcast land mobile communications, under conditions designed to preclude interference to co-channel TV assignments.

(*Editor's note: See separate story on this subject on page* 16 *of this issue of CH, and on page* 4 *of the June Communication Horizons.*)

The plan is premised on the judgement that the only feasible solution to the frequency demands of the nation's industry, local government and commerce lies in the spectrum now allocated to the entertainment field, but not necessarily required by broadcasters in the public interest.

The specifics of the plan, at the moment, do not go much farther than making use of the VHF channels proposed to be withdrawn from nine areas of the country—giving each of these areas 34 channels for non-broadcast services.

The 9 areas of the country principally affected would include Champaign and Rockford, Illinois; Hartford, Connecticut; Madison, Wisconsin; Erie, Pennsylvania; Binghampton, N.Y.; Columbia, South Carolina; Montgomery, Alabama; and Bakersfield, California.

Also expected to be drawn in under the same proposal would be such cities as Fresno, California; Lexington, Kentucky; Youngstown, Ohio; South Bend, Indiana and others where UHF television is already the sole medium of video entertainment.

The idea contemplates aid for both safety and special land mobile radio services using deintermixed VHF channels from 2 through 8; and common carrier land mobile services using channels 9 through 13.

The plan proposes land mobile radio channels 31.5 kilocycles wide, useable co-channel with VHF TV assignments at distances of 150 miles or more. The plan would limit base station antennas to 200 feet above a mean datum plane of average terrain altitude above sea level and with a maximum final radio frequency stage power of 600 watts.

Liberal, Kansas Broadcaster Draws Communications Fire

Tri-State Communications Company, whose radio tower at Liberal, Kansas has drawn formal pleading at the FCC from the Seward County Broadcasting Co., operator of broadcasting station KSCB, has advised the FCC that the broadcast company's laboriously concocted cases reduces itself to one of mistaken identification of the proposed sites resulting from an erroneous computation of the geographical coordinates and that there has been no willful "misrepresentation by Tri-State as charged by KSCB.

Ralph Heng, owner of Tri-State Communications, pointed out that while the geographical coordinates he originally attributed to the tower in question "were wrong," the "descriptive identification of the sites by reference to the nearest street and highway was absolutely correct." Heng further stated he had "no motive or purpose in supplying incorrect coordinates for his business radio service application or the domestic public land mobile service application later filed for the same location."

On the latter point, Mr. Heng said, the broadcaster's complaint had no validity since the common carrier application has subsequently been amended to specify a station location outside the area "in which the broadcast company claims radiation interference."

As for Mr. Heng's business radio tower, which also houses antennas of other organizations licensed in the petroleum and highway maintenance services, Tri-State pointed out that it had retained a licensed professional engineer to determine the coordinate of the proposed tower, and errors based on several factors . . including published coordinates for the KSCB tower . . . compounded the situation. Throughout, however, the company said its proposed and actual antenna site was "properly described" and the identity of the site "could easily be ascertained by its legal description in the county's records." An error in listing the coordinates of the business tower, the filing said, "was further compounded by an FCC typographical error" when the Tri-State business authorization was issued.

KSCB, Tri-State said, is trying, in its complaint against the business radio tower, to place on Mr. Heng "the blame for (its own very obvious engineering miscalculation" "This artifice," Tri-State continued, "accomplishes nothing because the Commission's rules do not protect the broadcaster from re-radiation interference."

The broadcaster had been called on the Commission carpet, at about the time the coordinate mistake was discovered, to clean up its radiation pattern. The station has never been able to "prove" its calculated directional pattern in actual service.

IACP Opposes 39.06 For Light Control

Muskegon, Michigan Police Chief Fred E. Castenholz, who heads up the Communications Committee for the International Association of Chiefs of Police has joined the ranks of opposition to the FCC's rule proposal to make the police radio frequency of 39.06 megacycles available in the local government radio service for control of traffic lights by mobile units installed in emergency vehicles. At the same time the City of Erie, Pennsylvania, whose request to the FCC for the projected rule change led to the Commission proposal, replied to comments filed by the Associated Public Safety Communications Officers, Inc.

Chief Castenholz, speaking for IACP, said the group is opposed to the removal of 39.06 from the present police radio service. The Chief further commented "while we do feel there is a need in the radio frequency spectrum for a frequency for radio control of traffic lights by mobile units installed in emergency vehicles, from our observation point it is felt that the frequencies allocated for police use are insufficient already and we certainly oppose any police frequency being transferred to any other service."

Meanwhile APCO and IMSA (International Municipal Signal Association) stated that while they support the theory of the rule proposal, they both feel that the local government frequency of 45.44 mc. should be used for this operation, or that existing channels in the 46 megacycle area be "split" and 46.65 megacycles be assigned for the local government service with a limitation of three watts input power for the proposed operation.

In its reply to the APCO-IMSA filing, the City of Erie said "we do not propose

a use which would result in a loss of the frequency 39.06 megacycles to the police radio service, but merely propose that the frequency be made also available to the local government service in order that local government entities desiring so can utilize it for a system of emergency traffic light control devices, such as we have developed." This would be a sharing rather that a preempting of the frequency.

"Furthermore," Erie said, "if the police of a given community do not wish to use 39.06 for a system of emergency traffic light control devices, then they need not do so. Obviously since the police are an instrumentality of the local government-with both having identical concern for the local public interest-there will be a mutual cooperation to insure that the radio spectrum is utilized in the best and most efficient manner."

Erie concluded its reply comments with "In view of the immediacy of the need for allowing operation of the need for allowing operation of radio emergency traffic light control devices, it simply is not practical now to start all over again in an effort to prove the feasibility of, and request approval for, the alternate frequencies 45.44 or 46.56, as suggested by APCO."

FAA Explains Slightly

In response to questions submitted to it in August by Washington communications' attorney Jeremiah Courtney, the Federal Aviation Agency has noted that it is "taking action to assure the elimination of any unnecessary notification which may be inadvertently requested of prospective radio licensees in connection with new FAA tall tower regulations."

"It is one of the responsibilities of the FAA, "the agency said," to advise various aeronautical charting agencies, such as the U.S. Coast Geodetic Survey, of prominent surface structures. Some of the aeronautical charts are quite detailed and display terrain contours in increments as small as 20 feet, together with relative man made structures."

R.E.T.

G·A·M

HIGH GAIN ANTENNAS

VHF 144-160 UHF 450-470

You've Seen Our Ad, You Purchased Our Antenna and You've Proven . . .

1 That it's tops in performance
2 That it's tops in quality
3 That it's a bargain at the price

PRICES FROM $19.75 LIST UP

TG-5-S FIXED STATION
$95.00 LIST

- Heavy duty construction
- Two half wave elements
- Can be cut to frequency
- Mounts on standard 1¼" pipe
- 52 Ohm Impedance
- SWR less than 1.5-1

Write for Catalog Listing All Models, Gain Figures and Radiation Patterns

CONTACT YOUR DISTRIBUTOR OR GAM DIRECT

G·A·M Electronics Inc.

138 LINCOLN ST. MANCHESTER, N. H.

Congressional Wrap-Up

87th Calls It Quits

If a clear inference is to be drawn from the performance of the first year of the 87th Congress, it is this: Changes have been recommended by the Congress for the existing Communications Act. If the two-way radio field is to benefit from these pending changes, members of the House of Representatives are going to have to "steal a little time" away from the more glamorous broadcasting field and devote a little more effort to *our highly important segment* of this country's economic life.

Case to point: Four pieces of direct concern to the two-way field legislation of direct concern to the two-way field were recommended this year by the Commission. Apart from the major changes in the Communications Act which allowed reorganizing of some sections of the FCC, the House did not even get to the point of scheduling committee hearings on the Commission recommended legislation. The Senate, on the other hand, passed favorably on all four.

This year's performance does not represent a new turn of events, but rather the historic position of the House in cases of minor legislation. The lack of House action reflects the attitude that only the most important piece of recommended legislation by a regulatory agency can be handled in any one Congressional session. This year it was the FCC reorganization bill—even to the detriment of a bill which would have set up a frequency allocation board to iron out long standing complaints about the division of the radio frequency space between government and non-government users.

The four measures of interest to the two-way radio field, as they were passed by the Senate this year, line up as follows:

(1) A bill looking toward a change in the Act to permit the Commission to stop requiring that applications and other types of documents submitted to the agency, be notarized, or otherwise subjected to an "oath of affirmation;"

(2) A bill which would require identical painting and lighting of inactive communications towers as that required of active towers;

(3) A bill to give the Commission statutory authority to impose light monetary fines in cases of nonbroadcast radio rule violations which the agency does not feel are severe to warrant more drastic action which it already has in its arsenal;

(4) A bill to permit the FCC to renew a license in the Safety and Special Radio Services more than 30 days before the current license expires.

While there may be some opponents to one or more of these four measures, they do represent efforts on the part of the Commission to have Congress consider some of the problems which the agency must face in the day-to-day administration of its duties. Whatever the case of opposition, or the lack of same, *Communication Horizons* feels that each of the four merited considerably more attention that the House of Representatives gave.

The four proposals are still pending, and face the House as unfinished business when it reconvenes in January. We don't feel that the House should necessarily rubber stamp the recommendations, especially in view of the opposition in some quarters. We do feel the measures should be either adopted or rejected, and not allowed to die. In short, the House should give the measures as much time as the Senate did. A few hours of committee hearings should be sufficient to permit all interested parties to present their views on all four bills, and lead to possible changes where existing language may be objectionable.

During the 1962 session, further consideration of the bills designed to allow a study of the frequency spectrum division between government and non-government uses is a virtual certainty.

Finally, in yet another area the Commission could well be expected to ask Congress to ease the limitations now contained in the Communications Act with respect to the agency's power to issue special temporary authority authorizations for safety-special stations whose applications must be listed publicly, subject to a 30 day waiting period, before action can be taken.

NEWS BRIEFS

Trenton Common Carrier Paging Solidified

The FCC's hearing on mututally exclusive common carrier one-way paging applications at Trenton, N.J.. . . . . of Telephone Answering Service of Trenton, and Radio Mobile Answering Service . . . was completed in a one day session under the direction of FCC Hearing Examiner Basil P. Cooper.

From a more complex beginning, the proceedings boiled down to a comparison of rates, regulations and proposed practices of the two applicant. Both are requesting assignment of the frequency 35.58 megacycles for selective code message service.

Proposed findings and conclusions are due October 23.

NEXT MONTH —

Communication Horizons inaugurates a new monthly column SOLID STATE COMMUNICATIONS, prepared and edited by Donald L. Stoner, world authority on solid-state semi-conductor communications applications. Author Stoner will keep CH readers first-informed on new and exciting developments in the field of solid-state apparatus as used in the very newest VHF and UHF two-way communications equipment. Engineers and technicians alike will find this exciting new -column must reading every month.

Watch For It!

RECEPTION UNDER ALL CONDITIONS!

- Masters your vehicle ignition noise!
- Masters other vehicle's ignition noise!
- Masters power line noise!
- Masters generator-regulator hash!
- Masters precipitation static!

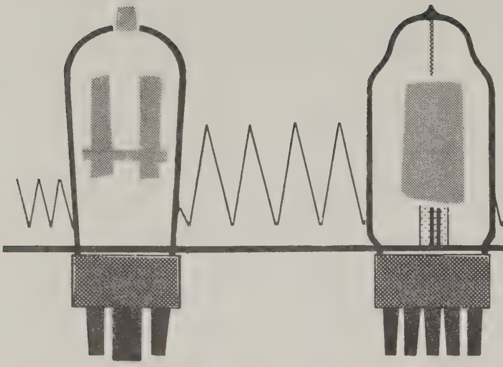
Write for Technical Bulletin

USER NET PRICE $42.50
Federal Excise Tax exempt user net price $39.40

Exemption Certificate must accompany order for deduction to apply.
Prices include prepaid surface transportation to Continental U.S.A. destinations.
Applicable State and Local taxes will be additional.

Advise Receiver, Make, Model, 1st I.F. frequency and receiver filament voltage (6 or 12 volt) — specify for base station or mobile unit.

HALLETT MANUFACTURING COMPANY 5912 Bowcroft St • Los Angeles 16
California



SERVICE PROFILE

'CISCO' RIDES HERD ON CALIFORNIA TWO-WAY

Maintaining two-way radio equipment isn't just Walt Cisco's business, it's his life.

Cisco, owner and operator of Pacific Communications, Motorola Service Station in Santa Marie, California, has all the ingredients of a successful two-way radio technician—ambition, ability and attitude.

As Cisco himself puts it, "I love the two-way radio business so it only follows, I'm going to do the best job I can."

Ever since he was president of the radio club in high school, Walt has been in "love with radio." Following graduation, he took a job grinding crystals. This lasted until World War II when he joined the Navy, went to radio school and became a radioman. It wasn't long until Walt was made a radioman first class, heading up the radio team of a destroyer.

Soon after the war, Walt joined Mobile Radio, Inc., Motorola service station in metropolitan Los Angeles. At the time, he was part of a two-man technician staff, servicing mainly police and fire radio systems. By 1956, he had been named shop foreman of a staff of 10, and in 1959, he was promoted to service superintendent. By then the staff had increased to 15.

It was in December of 1960 that Walt qualified as a Motorola service station, opening up his Santa Maria facility.

His business since that time has grown swiftly.

Starting out with a fully-equipped mobile van, Cisco is now about to increase his staff and is just finishing up the construction of a new, modern shop. At present, Pacific Communications services approximately 200 units, many of them at the missile center, Vandenberg Air Force Base.

Motorola technician Walt Cisco operates chiefly from inside this service bench on wheels. Mobile van contains all the service and test equipment the Pacific Communications Company owner requires.

Cisco's mobile van is like a service shop on wheels. It contains a service bench, comprehensive lines of service and test gear, and all the parts, tubes and miscellaneous equipment he might ever need on a call. Cisco reports he has several thousand dollars invested in equipment and maintains an approximate $1,000 supply of tubes and parts.

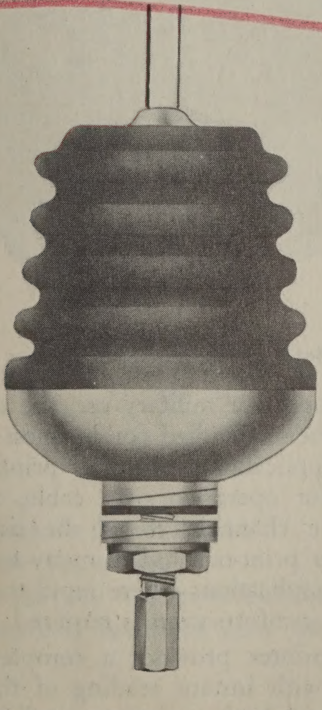
Much of his success Walt credits to the backup he has been given by Motorola.

To help provide his customers with fast service, Walt operates his own two-way radio system with his wife, Ophelia, who serves as dispatcher.

CH SHOWCASE

NEW PRODUCTS IN THE PROFESSIONAL COMMUNICATIONS FIELD

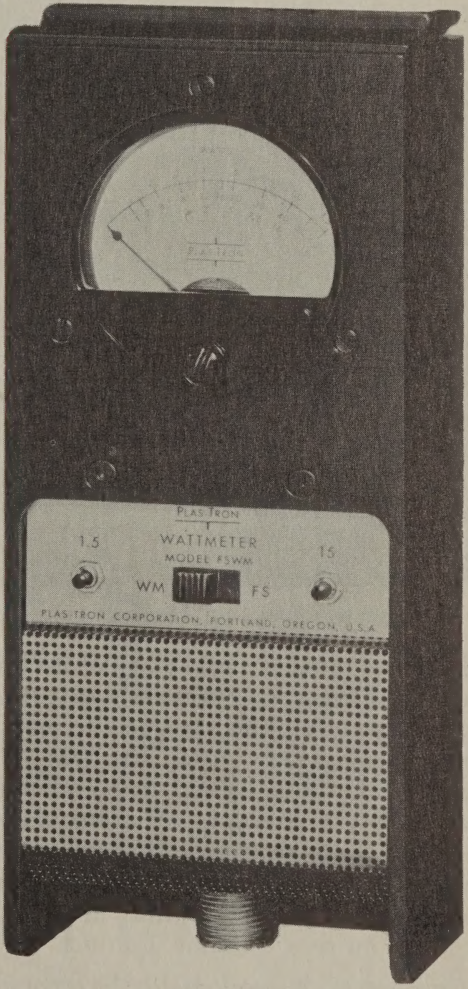
Prodelin, Inc. has announced a new 2.5 db gain whip antenna affording unusual reliability and ruggedness for 144-174 mc. mobile service. Designated as the Lewis Mobile Whip, the omni-directional antenna incorporates an impedance matching inductor which is easily tuned for maximum efficiency in the field. This feature allows tuning over a 20 megacycle range without cutting. The Lewis Mobile Whip has a VSWR of 1.1:1 over a 6 megacycle bandwidth.



Prodelin 2.5 db gain whip base

This newest of Prodelin two-way antennas is constructed of high strength stainless steel to withstand severe mobile shocks. For added reliability, it is grounded directly to the vehicle eliminating base insulators which frequently develop physical shock failures. The antenna mounts in a ⅝″ hole on flat or contour surfaces.

Plas-Tron, Incorporated, 815 S.W. Viewmont Drive, Portland, Oregon has hit the two-way field with a new portable, pocket-size, terminating wattmeter and field strength meter for the 2 to 250 megacycle range. Designated the Model FSWM, the meter features high accuracy in 0-to-1.5, 0-to-15 and 0-to-60 watt scales. A VSWR of 1.15:1 over the 2-250 megacycle range is claimed with accuracy of 5% of full scale power. The meter weighs in at 27 ounces and measures 1¾ inches high, 3 inches



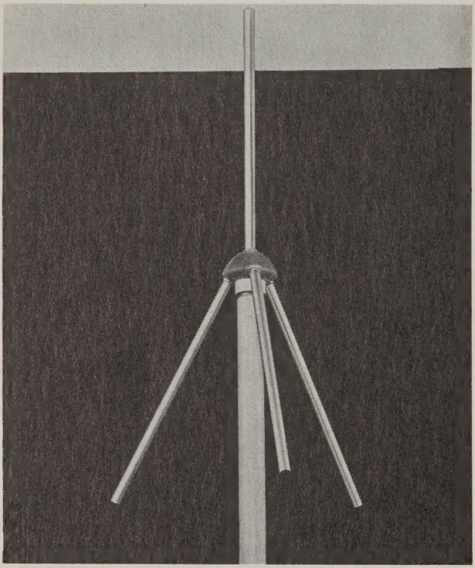
Plas-Tron Model FSWM meter

See above

wide and 7 inches long. Standard UHF (SO-239) connectors are provided for 50 ohm loads in and out. Types "N", "HN," and "C" are available on special order.

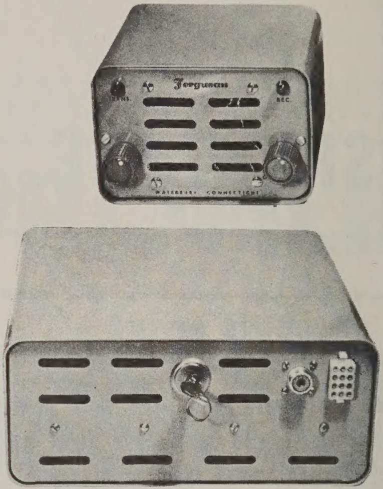
On the field strength meter function a built in collapsible antenna picks up the RF for indication purposes.

Plas-Tron has also announced a low-cost precision antenna for use in the 70-300 megacycle range, built to withstand rugged mountain top environment. The aluma-filled epoxy ground plane antenna is called the 10-2, and is corrosion resistant, sealed against moisture, and designed to handle powers up to 1000 watts. The same 10-2 antenna may also be purchased as a bi-directional phased array, consisting of twin 10-2 antennas with connecting harness or a cardioidal vertical reflector with mounting brackets. The single antenna mounts by screwing on to a common 1¼ inch pipe.



Plas-Tron 10-2 antenna

Ferguson Communications, Incorporated has announced a new series of 30 watt FM two-way radios which sell for $375.00 list FOB their Waterbury, Connecticut plant. The new 6100 series units operate in the 148-174 megacycle region, designed primarily for mobile duty. Westgarth F. Trayner, Jr., the new sales Manager for the firm, notes that "the unusually low price of the unit puts two-way Business Radio within reach of many small businesses which could not afford the higher priced equipment now on the market."



Ferguson Communications 6100 series

The firm can be contacted at 1299 Meriden Road in Waterbury, Conn.

Motorola has entered the field of Electronic Printers with a high speed page printer capable of producing 3,000 words per minute.

Motorola's High Speed Printer

Developed for military use, the new unit is now being readied for business and industry applications. The new printer is designed for operation over cable, radio or telephone channels, it can be used with computer print-out and in many communications applications where rapid transfer of records or information is required.

The printer provides a completely dry process with instant reading of the sheets possible while the printing is taking place.

COMMUNICATION HORIZONS

NEXT MONTH

HELD OVER

SY-PEP PAPER
Multi Transmitter-Receiver Installations
Problems and Cures

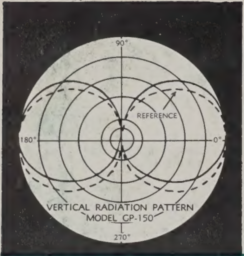
BRAND NEW

Solid State Communications
by
Donald L. Stoner, W6TNS

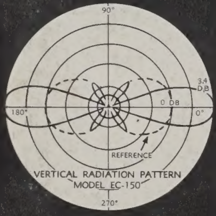
HELD OVER

A Brand New 450-470 MC/s Repeater

PLUS . . .
"Our Man in Washington"
"Product Showcase"
"Public Safety Communications"
and several features now in preparation



150 MC BASE STATION ANTENNA SYSTEM



3.4DB GAIN 5/4 WAVE COAXIAL ANTENNA

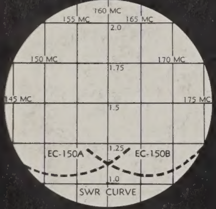
The Model EC-150 is an extended ⅝ wave length base station antenna which develops 3.4db omni-directional gain. The antenna is shunt fed through a hermetically sealed matching stub which places all parts of the antenna at direct DC ground potential for maximum lightning protection. Light weight all aluminum construction simplifies installation. The entire antenna is iridite treated to military specifications for maximum weatherability. It is furnished complete with a 2' extension of aluminum mounting mast including a flexible termination cable and Type N connector. Mounting clamp assemblies are available for side mounting the Model EC-150 on telephone poles and masts. Telephone Mount No. PEC. Mast Mount No. MEC. The antenna is available in two models which are adjustable over their respective frequency ranges. Model No. EC-150A, 148-161 mc. Model No. EC-150B, 161-174 mc.

MECHANICAL SPECIFICATIONS

Radiator	⅝" O.D. Aluminum Tubing
Skirt	2" O.D. Aluminum Tubing
Support Mast	1¼" O.D. Aluminum Tubing with 2' Exposed and available for mounting
Rated Wind Velocity	100 MPH at ½" Radial Ice
Overall Length (from base of skirt to top of radiator)	109"
Wind Surface Area	.52 sq. ft.
Wind Load at 100 MPH	16.4 lbs.
Bending Moment 6" Below Skirt	708 in. lbs.
Weight	4 lbs.

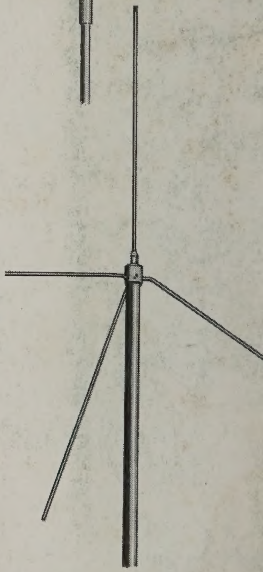
ELECTRICAL SPECIFICATIONS

Maximum Power Input	500 Watts
Nominal Input Impedance	50 ohms
Omni-Directional Gain	3.4db
Termination	Type N Male
VSWR	Less Than 1.5 to 1
Band Width	Plus or Minus 1%
Lightning Protection	Direct Ground



UNITY GAIN QUARTER-WAVE GROUND PLANE

The Model GP-150 is a low cost unity gain ground plane using drooping radials for impedance matching and to maximumize low angle radiation. It is built to commercial duty standards and rated at 100 MPH at ½" of radial ice. It is extremely light weight and constructed of aluminum which has been iridite treated according to military specifications for maximum weatherability.



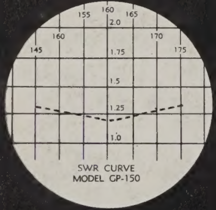
MECHANICAL SPECIFICATIONS

Overall Length Top to Mast	20"
Rated Wind Velocity	100 MPH at ½" Radial Ice
Net Weight	1 lb.
Wind Surface Area	.052 sq. ft.
Wind Load at 100 MPH	1.66 lbs.
Radiator	3/16 diameter solid aluminum rod
Radials	3/16 diameter solid aluminum rod

ELECTRICAL SPECIFICATIONS

Maximum Power	500 Watts
Nominal Impedance	50 ohms
VSWR	1.1 to 1
Band Width	Plus or Minus 5%
Frequency Range (Adjustable)	144 to 500 MC

(Also Available on specific frequency in the 108 to 144mc range.)



hy-gain

antenna products
1135 No. 22nd Lincoln, Nebr.

SOLD THROUGH DISTRIBUTORS EVERYWHERE